Methods: Serum 25(OH)D concentrations were measured in the same participants at 14 and 17 years (n = 1,045 at both time points). The percentage of adolescents with serum 25(OH)D concentrations < 50, 50-74.9 and ≥ 75 nmol/L was reported year-round and by month of blood collection. We examined predictors of serum 25(OH)D concentrations using a general linear mixed model (n = 919 at 14 years; n = 570 at 17 years).
Results: At 14 years, 31% of adolescents had serum 25(OH)D concentrations between 50-74.9 nmol/L and a further 4% had concentrations <50 nmol/L. At 17 years, 40% of adolescents had serum 25(OH)D concentrations between 50-74.9 nmol/L and 12% had concentrations <50 nmol/L. Caucasian ethnicity, being sampled at the end of summer, exercising more, having a lower BMI, a higher calcium intake and a higher family income were significantly associated with higher serum 25(OH)D concentrations.
Conclusions: The proportion of adolescents with serum 25(OH)D concentrations <50 nmol/L was low in this Western Australian cohort. There is a need for international consensus on defining adequate vitamin D status in order to determine whether strategies to improve vitamin D status in adolescents are warranted.
Funding source(s): NHMRC

PLASMA CAROTENOID LEVELS AS BIOMARKERS OF DIETARY CAROTENOID CONSUMPTION: A SYSTEMATIC REVIEW OF THE VALIDATION STUDIES

T. Burrows [1,2], R. Williams [1,2], M. Rollo [1], L. Wood [2], M. Garg [2], M. Jensen [1], C. Collins [1]. [1] *Nutrition and Dietetics, Faculty of Health and Medicine, University of Newcastle, Australia;* [2] *School of Biomedicine and Pharmacy, University of Newcastle, Australia*
E-mail: tracy.burrows@newcastle.edu.au (M. Garg)

Background/Aims: Previous research has demonstrated that plasma carotenoids are a reliable biomarker of usual fruit and vegetable intake. This review aims to synthesize (i) the mean dietary intake, (ii) the plasma concentrations of carotenoids reported from validation studies, and (iii) compare the strength of the relationship between the two, measured using different dietary assessment methods.
Methods: Six databases were used to locate studies that included: adult populations, assessment of dietary intake, measurement of plasma carotenoids and reported the comparison between the two measures.
Results: One hundred and forty two studies were included. The most common reported dietary carotenoid and plasma carotenoid was lycopene: weighted dietary mean intake (4,555.4 μg/day), and plasma concentration 0.62 μmol/L (95%CI: 0.61, 0.63, n = 56 studies). The strongest weighted correlation between the two measures was found for cryptoxanthin (r = 0.38, 95%CI: 0.35, 0.42) followed by α-carotene (r = 0.34, 95%CI: 0.31, 0.36).
Conclusions: This review synthesizes reference ranges for diet and plasma carotenoid concentrations and their expected associations based on validation studies conducted to date which provides a benchmark for future validation studies.
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DETERMINATION OF SIGNAL MOLECULES THAT CONTRIBUTE TO THE ANTIMESOTHELIOMA EFFECT OF A VITAMIN E ANALOGUE

A. Sato [1], R. Sugahara [1], Y. Sato [2], M. Ota [1,2], T. Yano [1,2]. [1] *Graduate School of Life Sciences, Toyo University, 347-0193 Gunma Japan, Japan;* [2] *Faculty of Life Sciences, Toyo University, 347-0193 Gunma Japan, Japan*
E-mail: yano_t@toyo.jp (A. Sato)

Background/Aims: Malignant mesothelioma (MM) is commonly caused by asbestos and is resistant to currently used anticancer agents. Tocotrienol (T3), a member of the vitamin E family, is known to have a powerful anticancer effect. In order to reinforce the activity, we synthesized an ether derivative of T3, 6-*O*-carboxypropyl-α-tocotrienol (T3E). In this study, we evaluated signal molecules responsible for the antimesothelioma effect of T3E by the comprehensive analysis of gene expression.
Methods: A human MM cell line (H2452) was cultured under hypoxia. Total RNA of H2452 was extracted after control, T3 and T3E treatment. Microarray was performed using the RNA, and data analysed by cascade evaluation on gene expression. From the cascade analysis, candidates relating to the antimesothelioma effect of T3E were determined.
Results: Forty nine proteins were detected as possible signal molecules contributing to the antimesothelioma effect of T3E From the proteins, interleukin-4 receptor (IL-4R) was determined as a signal molecule concerned with control of cell proliferation. Results of conventional pathway analysis showed suppression of IL-4 signalling by down-regulation of IL-4R. Furthermore, the pathway analysis showed activation of IL-1 and IL-6 signalling was also affected. These results indicate that IL-4 suppression antagonized IL-1 and IL-6-mediated signal activation.
Conclusions: This study suggests that IL-4 signalling, which has few reports on survival of malignant tumours, is important to the survival of MM, and that T3E may be an effective antimesothelioma agent due to its inhibition of IL-4 signalling.
Funding source(s): Inoue Enryo Memorial Foundation.

IN VITRO ANTI-PLATELET AND ANTIOXIDANT EFFECT OF *TASMANNIA LANCEOLATA* (NATIVE PEPPERBERRY)

J.M. Beckett [1], K.D.K. Ahuja [1], C. Booth [2], S. Ovenden [3], M.J. Ball [1]. [1] *School of Health Sciences, University of Tasmania, TAS, Australia;* [2] *Defence Science and Technology Organisation, Scottsdale, TAS, Australia;* [3] *Defence Science and Technology Organisation, Fishermans Bend, VIC, Australia*
E-mail: jbeckett@utas.edu.au (J.M. Beckett)

Background/Aims: *Tasmannia lanceolata* (TL) was first used as a food flavouring by Aborigines and early settlers. Recent studies have reported TL to have considerable antioxidant content. This study aimed to investigate the *in vitro* antiplatelet and antioxidant activity of extract derived from processed TL leaf (marc) on human blood components.
Methods: The *in vitro* effect of TL extract (0.01-0.1 mg/mL) on ADP-induced (2.5 μM) platelet aggregation in platelet rich plasma and copper-induced (100 μM) serum oxidation over 360 mins was measured in samples collected from 6 to 9 apparently healthy individuals. Results were compared between blank (no added TL extract) and different TL extract concentrations using mixed effects repeated measures analysis (STATA v13).
Results: Reductions in maximum platelet aggregation and increases in serum lipid oxidation lag times occurred with increasing concentrations of TL extract. Maximum platelet aggregation was reduced by 16% and 49% with the lowest (0.01 mg/mL) and highest (0.1 mg/mL) TL extract concentration respectively, compared with no added TL extract (p < 0.05). Maximum aggregation was reduced by 50% at a TL extract concentration between 0.03-0.06 mg/mL. Serum oxidation lag time was increased by 4 mins at the lowest TL concentration and by 159 mins (p < 0.001) at the highest TL concentration compared to no added TL extract. A 50% increase in lag time was observed at concentrations between 0.025 - 0.05 mg/mL.
Conclusions: This study demonstrated that *in vitro* platelet aggregation and oxidation of serum lipids were reduced by the TL marc extract in a concentration dependent manner.
Funding source(s): N/A.

VITAMIN D STATUS, DYSLIPEDEMIA AND MARKERS OF ENDOTHELIAL ACTIVATION IN OLDER ADULTS

A. Alyami [1], V. Lam [1], J.C. Mamo [1], J.L. Sherriff [1], A.P. James [1], Y. Zhao [1], M.J. Soares [1]. [1] *Directorate of Nutrition, Dietetics and Food Science, School of Public Health, Curtin University, WA, Australia*
E-mail: alimahdim.alyami@postgrad.curtin.edu.au (A. Alyami)

Background/Aims: There is increasing interest in the extra-skeletal effects of vitamin D on chronic diseases including CVD. The objective of this study was to determine whether circulating lipids, systemic inflammation and biomarkers of endothelial cell activation varied across vitamin D status of older Australians.
Methods: One hundred and one participants were proportionately sampled across tertiles of 25-hydroxy-vitamin D_3 from a larger cohort of free living older adults. Blood samples after an overnight fast were assayed for parathyroid hormone (PTH), insulin, TAG, total cholesterol (TC) and lipid fractions. Markers of systemic inflammation and endothelial activation included hsCRP, TNF-α, hepatocyte growth factor (HGF), P-selectin and

soluble vascular cell adhesion molecule (sVCAM) amongst others. Eighty three participants (48 women, 35 men) aged (mean ± SD) 65 ± 7.7 years, BMI 28 ± 4.5 kg/m^2 with complete data entered the analysis. A general linear model multivariate analysis with a backward elimination stepwise procedure was performed (SPSS version 22).
Results: The final model built based on a parsimonious model, which included age, gender, BMI, McAuley's index as confounders but excluded season, medications and PTH, indicated that there were significant differences across vitamin D tertiles in TC (T1 > T3, $p = 0.003$), LDL-cholesterol (T1 > T3, $p = 0.005$), HGF (T1 < T3, $p = 0.009$; T2 < T3, $p = 0.047$) and sVCAM (T1 < T3, $p = 0.04$).
Conclusions: Lower vitamin D status was associated with higher total and LDL-cholesterol, and lower HGF and sVCAM. Overall the data are suggestive of a role for the vitamin in CVD.
Funding source(s): NHMRC, Medical Health Research Infrastructure Foundation and School of Public Health, Curtin University

ASSOCIATIONS BETWEEN DIETARY IRON AND ZINC INTAKES AND IRON AND ZINC STATUS IN PREMENOPAUSAL WOMEN

K. Lim [1], E.A. Szymlek-Gay [1], A.O. Booth [1], C.A. Nowson [1], S.A. McNaughton [1], R.S. Gibson [2], K.B. Bailey [2], D. Irving [3], J. Fisher [3], A. Keller [3], L.J. Riddell [1]. [1] *Centre for Physical Activity and Nutrition Research, Deakin University VIC, Australia;* [2] *Department of Human Nutrition, University of Otago, Dunedin, New Zealand;* [3] *Australian Red Cross Blood Service, NSW, Australia*
E-mail: k.lim@deakin.edu.au (K. Lim)

Background/Aims: Foods recognised as good sources of iron tend to also contain zinc, and biochemical iron and zinc status may track each other. The aim of this study was to investigate whether there are associations between dietary iron and zinc intake, and between iron and zinc status in a convenience sample of Australian premenopausal women.
Methods: Women (18-50 years) were recruited in Melbourne and Sydney for this cross-sectional study. Dietary intake was assessed via a 150-item food frequency questionnaire (FFQ) and intakes were energy-adjusted using the residual method. Serum ferritin and serum zinc were used as markers of iron and zinc status. Demographic, anthropometric and blood donation information was collected. Multiple linear regression (dietary iron and serum ferritin as dependent variables) and χ^2 were used to investigate associations.
Results: The FFQ was completed by 382 women, with 86% also providing blood samples. Using multiple regression, dietary iron intake was associated with dietary zinc intake ($\beta = 0.46$; 95% CI: 0.39, 0.54). There was also an association between natural log-transformed μg/L serum ferritin and μmol/L serum zinc ($\beta = 0.06$; 95%CI: 0.02, 0.10), however prevalence of low zinc concentrations did not differ between women with low or adequate iron stores ($p = 0.92$).
Conclusions: There appears to be a modest association between dietary iron and zinc intake and a possible association between iron and zinc status in Australian premenopausal women.
Funding source(s): Deakin University Partnership Grant Scheme; Centre for Physical Activity and Nutrition Research; Australian Red Cross Blood Service; Meat & Livestock Australia Ltd.

DIETARY MICRONUTRIENT INTAKE AND CARDIOVASCULAR RISK FACTORS IN A POPULATION AT RISK OF HEART FAILURE

A.J. Owen [1], E. Ashton [1], D.J. Campbell [2], C.M. Reid [1], D. Liew [3], U. Boffa [4], S. Stewart [5], H. Krum [1]. [1] *Epidemiology & Preventive Medicine, Monash University, VIC, Australia;* [2] *Molecular Cardiology, St Vincent's Institute, VIC, Australia;* [3] *Melbourne EpiCentre, Melbourne University, VIC, Australia;* [4] *School of Medicine, University of Adelaide, SA, Australia;* [5] *Baker-IDI Heart & Diabetes Institute, VIC, Australia*
E-mail: alice.owen@monash.edu (A.J. Owen)

Background/Aims: It has been suggested that mild deficiencies of key micronutrients may influence risk of development of heart failure. The present study aimed to examine the relationship between micronutrient intake, cardiovascular risk factors and left ventricular hypertrophy in a cohort of older persons at risk of developing heart failure.
Methods: In a cohort of 460 men and women (mean age ± SD: 72 ± 5 years) dietary intake was assessed using a 4-day weighed food diary. Cardiovascular health and risk was examined by a series of measures including medical history, anthropometry, blood pressure, and echocardiography. Multivariate regression analyses were used to examine the relationships between micronutrient intake, cardiovascular risk and function.
Results: More than half of this at-risk cohort consumed less than recommended levels of calcium, folate, zinc and magnesium, and less than 20% met sodium intake recommendations. After covariate adjustment, magnesium intake was inversely correlated with heart rate ($\beta = -0.095$, $p = 0.038$). Left ventricular mass index was positively associated with dietary niacin intake in this group ($\beta = 0.206$, $p = 0.005$), however no other echocardiographic measures were associated with dietary micronutrient intake.
Conclusions: In a cohort at risk of heart failure and with deficiencies in dietary intake of several micronutrients, magnesium intake was associated with a lower heart rate. The association between niacin intake and left ventricular hypertrophy suggests prospective examination of niacin intake and development of diastolic dysfunction should be undertaken.
Funding sources: NHMRC, Monash University.

TOOLS USED TO ASSESS FLAVONOID INTAKE OF ADULTS IN FOOD-BASED STUDIES: A SYSTEMATIC LITERATURE REVIEW

K. Woods [1], Y. Probst [1], A. McMahon [1], A. Clancy [1]. [1] *School of Medicine, University of Wollongong, Australia*
E-mail: ktw003@uowmail.edu.au (K. Woods)

Background/Aims: To identify the patterns of use and origins of tools used to assess adult flavonoid intake.
Methods: A systematic literature review using Scopus and Web of Science databases (2009-2014) with keywords 'phytochemical*', 'flavonoid*', 'food*', 'database*' and 'human*' was conducted. Publications were limited to English language, and food-based studies involving participants ≥ 18 years, assessing flavonoid and/or flavonoid subclass intake using a specified tool or combination of tools.
Results: Twenty two publications were included. Ten differing tools with varying versions and release dates were used, of which 77% ($n = 17$) used more than one tool and/or constructed their own tools using amalgamations of data from those pre-existing; including USDA databases for flavonoid, proanthocyanidin or isoflavone content of selected foods, and the Phenol-Explorer database. Flavonoid and/or subclass assessed and the country in which food intake data originated appeared to influence the tool/s chosen. The flavonoid examined varied which impacted on the tool chosen. One US study demonstrated this, estimating proanthocyanidin intake using the USDA proanthocyanidin database. One Australian and one Korean study sourced tools from other countries because no geographically relevant phytochemical database existed, indicating a clustering of tools towards certain areas of the world.
Conclusions: A range of tools are used worldwide to assess flavonoid intake of adults. Phytochemical class to be assessed, and the country where intake data is being collected are important considerations when selecting appropriate tools to estimate intake. Development of tools that are more geographically suited to certain regions of the world are needed.
Funding source(s): NHMRC.

A SYSTEMATIC INVESTIGATION OF THE MOST ACCURATE AND COST-EFFECTIVE METHOD FOR MEASURING IODINE DEFICIENCY FOR PREGNANT WOMEN

L. Houston [1], Y. Probst [1]. [1] *School of Medicine, University of Wollongong, Australia*
E-mail: lah993@uowmail.edu.au (L. Houston)

Background/Aims: Iodine deficiency (ID) is a global public health problem and the most common cause of preventable foetal brain damage during pregnancy. The aim of this study was to determine the most accurate and cost effective method available to monitor ID in pregnant women.
Methods: A systematic literature review using the MEDLINE and Scopus databases (1994-2014) and combinations of keywords: monitor*, observ*,